

Sample Name: GPP Dice

Main Substance: Si

The above sample(s) and information were provided by the client.

SGS Job No.: TIC1020240305135311YEBT

Sample Receiving Date: Mar 08, 2024

Testing Period: Mar 08, 2024 ~ Mar 18, 2024

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Halogen	See Results
Red Phosphorus	See Results
European Regulation POPs (EU) 2019/1021 Annex I and its amendments	Pass
Persistent, Bioaccumulative, and Toxic (PBT) Chemicals under US EPA Toxic Substances Control Act (TSCA) Section 6(h)	Pass
Phthalates	See Results
AfPS GS 2019:01 PAK-Polycyclic Aromatic Hydrocarbons (PAHs)	See Results

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.



Carol Luo
Approved Signatory



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Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A11	SHA24-0040259-0001.C011	Grey solid

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) “-“ = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU - Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A11
Lead (Pb)	1000	mg/kg	2	51779▲
Mercury (Hg)	1000	mg/kg	2	ND
Cadmium (Cd)	100	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybromobiphenyl (PBB)	1000	mg/kg	-	ND
Monobrominated biphenyl (MonoBB)	-	mg/kg	5	ND
Dibrominated biphenyl (DiBB)	-	mg/kg	5	ND
Tribrominated biphenyl (TriBB)	-	mg/kg	5	ND
Tetrabrominated biphenyl (TetraBB)	-	mg/kg	5	ND
Pentabrominated biphenyl (PentaBB)	-	mg/kg	5	ND
Hexabrominated biphenyl (HexaBB)	-	mg/kg	5	ND
Heptabrominated biphenyl (HeptaBB)	-	mg/kg	5	ND
Octabrominated biphenyl (OctaBB)	-	mg/kg	5	ND
Nonabrominated biphenyl (NonaBB)	-	mg/kg	5	ND
Decabrominated biphenyl (DecaBB)	-	mg/kg	5	ND
Polybromodiphenyl ether(PBDE)	1000	mg/kg	-	ND
Monobrominated diphenyl ether (MonoBDE)	-	mg/kg	5	ND
Dibrominated diphenyl ether (DiBDE)	-	mg/kg	5	ND
Tribrominated diphenyl ether (TriBDE)	-	mg/kg	5	ND
Tetrabrominated diphenyl ether (TetraBDE)	-	mg/kg	5	ND
Pentabrominated diphenyl ether (PentaBDE)	-	mg/kg	5	ND
Hexabrominated diphenyl ether (HexaBDE)	-	mg/kg	5	ND
Heptabrominated diphenyl ether (HeptaBDE)	-	mg/kg	5	ND



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Test Item(s)	Limit	Unit(s)	MDL	A11
Octabrominated diphenyl ether (OctaBDE)	-	mg/kg	5	ND
Nonabrominated diphenyl ether (NonaBDE)	-	mg/kg	5	ND
Decabrominated diphenyl ether (DecaBDE)	-	mg/kg	5	ND
Bis(2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND
Dibutyl phthalate (DBP)	1000	mg/kg	50	ND
Diisobutyl phthalate (DIBP)	1000	mg/kg	50	ND

Notes:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series.
- (3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
- (4) Lead (Pb): The reported result is for reference only.
- (5) ▲ According to the declaration from the client, Lead (Pb) in No.A11 is exempted by EU RoHS directive 2011/65/EU based on [ANNEX III 7(c)-I]: Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

More information about exemption can be found via the following link:

<https://rohs.sgsonline.com.cn/PDFLinks/en/RSTS-TP-037%20RoHS%20Exemption%20%28EN%29.pdf>

Halogen

Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	Unit(s)	MDL	A11
Fluorine(F)	mg/kg	50	ND
Chlorine(Cl)	mg/kg	50	ND
Bromine(Br)	mg/kg	50	ND
Iodine(I)	mg/kg	50	ND

Red Phosphorus

Test Method: With reference to SGS In house method, analysis was performed by ICP-OES and Pyrolysis-GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A11
Red Phosphorus	7723-14-0	mg/kg	500	ND

Notes:

- (1) The testing result is based on the worst-case scenario, and confirmed by Pyrolysis-GC-MS.

European Regulation POPs (EU) 2019/1021 Annex I and its amendments

Test Method: SGS In-House method, analysis was performed by GC-MS, GC-NCI-MS, GC-ECD and HPLC-DAD/MS or LC-MS/MS.



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Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A11
Tetrabromodiphenyl ether	40088-47-9 and others	-	mg/kg	5	ND
Pentabromodiphenyl ether	32534-81-9 and others	-	mg/kg	5	ND
Hexabromodiphenyl ether	36483-60-0 and others	-	mg/kg	5	ND
Heptabromodiphenyl ether	68928-80-3 and others	-	mg/kg	5	ND
Decabromodiphenyl ether; (decaBDE)	1163-19-5	-	mg/kg	5	ND
Sum of PBDEs*	-	500	mg/kg	-	ND
PFOS, its salts and related compounds					
Perfluorooctane sulfonates (PFOS), its salts^	1763-23-1	-	mg/kg	0.010	ND
N-ethylperfluoro-1-octanesulfonamide (N-EtFOSA)	4151-50-2	-	mg/kg	0.010	ND
N-methylperfluoro-1-octanesulfonamide (N-MeFOSA)	31506-32-8	-	mg/kg	0.010	ND
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (N-EtFOSE)	1691-99-2	-	mg/kg	0.010	ND
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (N-MeFOSE)	24448-09-7	-	mg/kg	0.010	ND
Perfluorooctane sulfonamide (PFOSA), its salts^	754-91-6	-	mg/kg	0.010	ND
Perfluorooctane sulfonates (PFOS) and its derivatives	-	1000	mg/kg	-	ND
Hexachlorobenzene	118-74-1	10	mg/kg	5	ND
Pentachlorobenzene	608-93-5	Prohibited	mg/kg	5	ND
Polychlorinated biphenyls (PCBs)	1336-36-3 and others	50	mg/kg	5	ND
Hexabromodiphenyl	36355-01-8	Prohibited	mg/kg	5	ND
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α -HBCDD, β -HBCDD, γ -HBCDD)	134237-50-6, 134237-51-7, 134237-52-8, 25637-99-4, 3194-55-6	100	mg/kg	20	ND
Hexachlorobutadiene	87-68-3	Prohibited	mg/kg	5	ND
Polychlorinated naphthalenes (PCNs)	70776-03-3 and others	Prohibited	mg/kg	5	ND
Alkanes C10-13, chloro(short chain-chlorinated paraffins) (SCCPs)	85535-84-8 and others	1500	mg/kg	50	ND
Perfluorooctanoic acid (PFOA), its salts^	335-67-1	0.025	mg/kg	0.010	ND
PFOA-related compounds					
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS), its salts^	39108-34-4	-	mg/kg	0.010	ND
Methyl perfluorooctanoate (Me-PFOA)	376-27-2	-	mg/kg	0.100	ND
Ethyl perfluorooctanoate (Et-PFOA)	3108-24-5	-	mg/kg	0.100	ND



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Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A11
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA)	27905-45-9	-	mg/kg	0.100	ND
1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA)	1996-88-9	-	mg/kg	0.100	ND
Perfluoro-1-iodooctane (PFOI)	507-63-1	-	mg/kg	0.100	ND
2H,2H-Perfluorodecane Acid (H ₂ PFDA/8:2 FTCA), its salts [^]	27854-31-5	-	mg/kg	0.010	ND
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7	-	mg/kg	0.100	ND
1-Iodo-1H,1H,2H,2H-perfluorodecane (8:2 FTI)	2043-53-0	-	mg/kg	0.100	ND
1H,1H,2H,2H-Perfluorodecyltriethoxysilane (8:2 FTSi(OC ₂ H ₅) ₃)	101947-16-4	-	mg/kg	0.100	ND
bis(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptafluorodecyl) hydrogen phosphate (8:2 diPAP), its salts [^]	678-41-1	-	mg/kg	0.010	ND
2H,2H,3H,3H-Perfluoroundecanoic Acid (H ₄ PFUnDA / 8:3 FTCA), its salts [^]	34598-33-9	-	mg/kg	0.010	ND
1H,1H,2H-Heptafluoro-1-decene (PFDE)	21652-58-4	-	mg/kg	0.100	ND
3-Perfluoroheptyl propanoic acid (7:3 FTCA)	812-70-4	-	mg/kg	0.010	ND
Sum of PFOA-related compounds	-	1.0	mg/kg	-	ND
Perfluorohexane Sulfonate (PFHxS), its salts [^]	355-46-4	0.025	mg/kg	0.010	ND
PFHxS-related compounds					
N-Methylperfluoro-1-hexanesulfonamide (N-Me-PFHxSA)	68259-15-4	1	mg/kg	0.010	ND
Perfluorohexane sulfonamide (PFHxSA)	41997-13-1	1	mg/kg	0.010	ND
N-[3-(dimethylamino)propyl]tridecafluorohexanesulphonamide (N-AP-FHxSA)	50598-28-2	1	mg/kg	0.010	ND
2-[methyl[(tridecafluorohexyl)sulphonyl]amino]ethyl acrylate)) (N-MeFHSEA)	67584-57-0	1	mg/kg	0.500	ND
2-Propenoic acid, 2-methyl-, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl ester	67584-61-6	1	mg/kg	0.100	ND
2-Propenoic acid, 2-methyl-, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl ester	67906-70-1	1	mg/kg	0.100	ND
1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-(2-hydroxyethyl)-N-methyl-(MeFHxSE)	68555-75-9	1	mg/kg	0.010	ND
Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]-	68957-32-4	1	mg/kg	0.010	ND



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Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A11
Sum of PFHxS-related compounds	-	1	mg/kg	-	ND
Conclusion					Pass

Notes:

- (1) Substances in Annex I of European Regulation POPs (EU) 2019/1021 Annex I are prohibited in preparations and constituents of articles unless otherwise specified.
- (2) Exemptions: Tetrabromodiphenyl ether, pentabromodiphenyl ether, hexabromodiphenyl ether, heptabromodiphenyl ether and decabromodiphenyl ether are ≤ 10 mg/kg for substances, and Sum of tetra-, penta-, hexa-, hepta- and decaBDE ≤500 mg/kg for mixtures or articles, this restriction is subject to subject to review and assessment by the European by 16 July 2021.
- (3) Exemption: Tetrabromodiphenyl ether, pentabromodiphenyl ether, hexabromodiphenyl ether, heptabromodiphenyl ether and decabromodiphenyl ether in electrical and electronic equipment within the scope of Directive 2011/65/EU are exempted.
- (4) Exemption: Alkanes C10-13, chloro (short chain-chlorinated paraffins) (SCCPs) < 1.0% (w/w) in preparation, <0.15% (w/w) for articles.
- (5) Exemptions: Perfluorooctane sulfonates (PFOS) and its derivatives (acid, metal salt, halide, amide, and other derivatives including polymers) ≤ 10 mg/kg for preparations, < 0.1% (w/w) for articles and < 1µg/m² for textiles and coated materials.
- (6) Exemptions: HBCDD no more than 100 mg/kg as an unintentional trace contaminant in substances, mixtures, articles or flame-retarded parts of articles.
- (7) Sum of PBDEs* Means Sum of Tetrabromodiphenyl ether, Pentabromodiphenyl ether, Hexabromodiphenyl ether, Heptabromodiphenyl ether and Decabromodiphenyl ether.
- (8) ^=Substances of PFOS, PFOA and PFOA-related compounds refer to their salts/derivatives listed in below table.

Substance Name	CAS No.
PFOS, its salts & derivatives	
Perfluorooctane sulfonates (PFOS)	1763-23-1
Potassium Perfluorooctanesulfonate (PFOS-K)	2795-39-3
Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
Sodium perfluorooctanesulfonate (PFOS-Na)	4021-47-0
Ammonium perfluorooctanesulfonate (PFOS-NH ₄)	29081-56-9
Perfluorooctane sulfonate diethanolamine salt (PFOS-NH ₂ (C ₂ H ₄ OH) ₂)	70225-14-8
Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-N(C ₂ H ₅) ₄)	56773-42-3
N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-N(C ₁₀ H ₂₁) ₂ (CH ₃) ₂)	251099-16-8
Perfluorooctane Sulfonyl fluoride (PFOS-F)	307-35-7
Magnesium bis(heptadecafluorooctanesulphonate) (PFOS-Mg)	91036-71-4
Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOSA, its salts	
Perfluorooctane Sulfonamide (PFOSA)	754-91-6
Perfluorooctanesulfonamide lithium salt (1:1) (PFOSA-Li)	76752-79-9
PFOA, its salts & derivatives	
Perfluorooctanoic acid (PFOA)	335-67-1
Sodium perfluorooctanoate (PFOA-Na)	335-95-5
Potassium perfluorooctanoate (PFOA-K)	2395-00-8
Silver perfluorooctanoate (PFOA-Ag)	335-93-3



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Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
Lithium perfluorooctanoate(PFOA-Li)	17125-58-5
8:2 FTS, its salts	
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4
Potassium 1H,1H,2H,2H-Perfluorodecane sulfonate (8:2 FTS-K)	438237-73-1
Ammonium 1H,1H,2H,2H-Perfluorodecane sulfonate (8:2 FTS-NH ₄)	149724-40-3
Sodium 1H,1H,2H,2H-Perfluorodecane sulfonate (8:2 FTS-Na)	27619-96-1
H₂PFDA/8:2 FTCA, its salts	
2H,2H-Perfluorodecane Acid (H ₂ PFDA/8:2 FTCA)	27854-31-5
Tetrabutylphosphonium 2H,2H-Perfluorodecanoate (8:2 FTCA-P(C ₄ H ₉) ₄)	882489-14-7
8:2diPAP, its salts	
Bis(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl) hydrogen phosphate (8:2diPAP)	678-41-1
Sodium bis(1H,1H,2H,2H-perfluorodecyl)phosphate (8:2diPAP-Na)	114519-85-6
H₄PFUnDA/ 8:3 FTCA, its salts	
2H,2H,3H,3H-Perfluoroundecanoic acid (H ₄ PFUnDA/ 8:3 FTCA)	34598-33-9
Potassium 2H,2H,3H,3H-Perfluoroundecanoate (H ₄ PFUnDA-K)	83310-58-1

(9) PFHxS, its salts and PFHxS related compounds:

(a) Commission Delegated Regulation (EU) 2023/1608 of May 30, 2023, amending Annex I to Regulation (EU) 2019/1021 Annex I as regards the listing of perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds, Official Journal of the EU, August 8, 2023.

Substance	Scope	Specific exemption on intermediate use or other specification	Effective Date
PFHxS and its salts	Substances, mixtures or articles	≤ 0.025 mg/kg	August 28, 2023
PFHxS-related compounds	Substances, mixtures or articles	≤ 1 mg/kg (individual or sum of all)	August 28, 2023
PFHxS, its salts and PFHxS-related compounds	Concentrated firefighting foam	≤ 0.1 mg/kg (to be reviewed within three years after entry into force of this amending regulation with a view to lower the limit)	August 28, 2023

(b) The tested perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds in this report comes from the “Listed under the POPs Regulation” of ECHA, please find more information via below weblink: [List of substances proposed as POPs - ECHA \(europa.eu\)](https://echa.europa.eu/en/chemicals/pop-substances)

(c) ^=Substances of PFHxS refer its salts/derivative listed in below table.

Substance Name	CAS No.
PFHxS, its salts & derivatives	
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4
1-Hexanesulfonic acid, 1,1,2,2,3,3, 4,4,5,5,6,6,6-tridecafluoro-, sodium salt (PFHxS-Na)	82382-12-5
Potassium perfluorohexane-1-sulphonate (PFHxS-K)	3871-99-6
Perfluorohexane Sulfonic acid, lithium salt (PFHxS-Li)	55120-77-9
Perfluorohexane Sulfonic acid, ammonium salt (PFHxS-NH ₄)	68259-08-5
Benzyltriphenylphosphonium tridecafluorohexane-1-sulfonate (PFHxS-)	1000597-52-3



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BTPP)	
N,N,N-Tributylbutan-1-aminium tridecafluorohexane-1-sulfonate (PFHxS-N(C ₄ H ₉) ₄)	108427-54-9
Tetraethylammonium perfluorohexane sulfonate (PFHxS-N(C ₂ H ₅) ₄)	108427-55-0
Tridecafluorohexane-1-sulfonic acid-pyrrolidine (PFHxS-NC ₄ H ₉)	1187817-57-7
4-[[4-(Diethylamino)phenyl][4-(ethylamino)naphthalen-1-yl]methylidene]-N,N-diethylcyclohexa-2,5-dien-1-iminium tridecafluorohexane-1-sulfonate (PFHxS-(NC ₁₀ H ₁₄) ₃ C ₅ H ₄)	1310480-24-0
4-[[4-(Dimethylamino)phenyl][4-(ethylamino)naphthalen-1-yl]methylidene]-N,N-dimethylcyclohexa-2,5-dien-1-iminium tridecafluorohexane-1-sulfonate (PFHxS-(NC ₈ H ₁₀) ₂ C ₁₃ H ₁₂)	1310480-27-3
4-[[4-(Dimethylamino)phenyl][4-(phenylamino)naphthalen-1-yl]methylidene]-N,N-dimethylcyclohexa-2,5-dien-1-iminium tridecafluorohexane-1-sulfonate (PFHxS-(NC ₈ H ₁₀) ₂ C ₁₇ H ₁₂)	1310480-28-4
Beta-Cyclodextrin, compd. with 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexane-1-sulfonate (PFHxS-C ₄₂ H ₇₀ O ₃₅)	1329995-45-0
Gamma-Cyclodextrin, compd. with 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexane-1-sulfonate (PFHxS-C ₄₈ H ₈₀ O ₄₀)	1329995-69-8
Triphenylsulfanium tridecafluorohexane-1-sulfonate (TPS-PFHxS)	144116-10-9
1-(Carboxymethyl)-4-(2-{4-[4-(2,2-diphenylethenyl)phenyl]-1H,2H,3H,3aH,4H,8bH-cyclopenta[b]indol-7-yl}ethenyl)quinolin-1-ium tridecafluorohexane-1-sulfonate (PFHxS-C ₄₄ H ₃₇ N ₂ O ₂)	1462414-59-0
Diphenyliodonium tridecafluorohexane-1-sulfonate (PFHxS-I(C ₆ H ₅) ₂)	153443-35-7
Tetramethylammonium perfluorohexane sulfonate (PFHxS-TMA)	189274-31-5
Tert-butylazanium; 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexane-1-sulfonate (PFHxS-NH ₂ (CH ₃) ₃)	202189-84-2
Bis(4-tert-butylphenyl)iodanium tridecafluorohexane-1-sulfonate (PFHxS-I(C ₆ H ₄) ₂ (C ₄ H ₉) ₂)	213740-81-9
Bis(4-methylphenyl)(phenyl)sulfanium tridecafluorohexane-1-sulfonate (PFHxS-S(C ₇ H ₇) ₂ C ₆ H ₅)	341548-85-4
Sulfonium, (thiodi-4,1-phenylene)bis[diphenyl-, salt with perfluorohexanesulfonic acid (1:2) (PFHxS-S ₃ (C ₆ H ₅) ₄ (C ₆ H ₄) ₂)	421555-73-9
Perfluorohexanesulfonic acid, Gallium(3+) salt (3:1) (PFHxS-Ga)	341035-71-0
Perfluorohexanesulfonic acid, Scandium(3+) salt (3:1) (PFHxS-Sc)	350836-93-0
Perfluorohexanesulfonic acid, Neodymium(3+) salt (3:1) (PFHxS-Nd)	41184-65-0
Perfluorohexanesulfonic acid, Yttrium(3+) salt (3:1) (PFHxS-Y)	41242-12-0
Cesium perfluorohexanesulfonate (PFHxS-Cs)	92011-17-1
Perfluorohexanesulfonic acid, Zinc salt (PFHxS-Zn)	70136-72-0
Iodonium, bis[4-(1,1-dimethylpropyl)phenyl]-, perfluorohexanesulfonate (1:1) (PFHxS-I(C ₆ H ₄) ₂ (C ₅ H ₁₁) ₂)	421555-74-0
Tris(4-tert-butylphenyl)sulfanium tridecafluorohexane-1-sulfonate (PFHxS-S(C ₆ H ₄) ₃ (C ₄ H ₉) ₃) (PFHxS-S(C ₆ H ₄) ₃ (C ₄ H ₉) ₃)	425670-70-8
Tridecafluorohexanesulphonic acid, compound with 2,2'-iminodiethanol (1:1) (PFHxS-NH(C ₂ H ₅ O) ₂)	70225-16-0
Triethylammonium perfluorohexane sulfonate (PFHxS-N(C ₂ H ₅) ₃)	72033-41-1
Iodonium, bis[(1,1-dimethylethyl)phenyl]-, salt with perfluorohexanesulfonic acid (1:1) (PFHxS-I(C ₆ H ₄) ₂ (C ₄ H ₉) ₂)	866621-50-3
(4-Methylphenyl)diphenylsulfanium tridecafluorohexane-1-sulfonate (PFHxS-S(C ₆ H ₅) ₂ C ₇ H ₇)	910606-39-2
{4-[(2-Methylprop-2-enoyl)oxy]phenyl}diphenylsulfanium	911027-68-4



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tridecafluorohexane-1-sulfonate (PFHxS-S(C ₆ H ₅) ₂ C ₁₀ H ₉ O ₂)	
Dibenzo[k,n][1,4,7,10,13]tetraoxathiacyclopentadecinium, 19-[4-(1,1-dimethylethyl)phenyl]-6,7,9,10,12,13-hexahydro-, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-1-hexanesulfonate (1:1) (PFHxS-SC ₂₈ H ₃₁ O ₄)	928049-42-7
Perfluorohexylsulfonyl fluoride (PFHxS-F)	423-50-7
Perfluorohexylsulfonyl chloride (PFHxS-Cl)	55591-23-6
Sulfonium, [4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]diphenyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-1-hexanesulfonic acid (1:1), polymer with 2-ethyltricyclo[3.3.1.1 ^{3,7}]dec-2-yl 2-methyl-2-propenoate, 3-hydroxytricyclo[3.3.1.1 ^{3,7}]dec-1-yl 2-methyl-2-propenoate and tetrahydro-2-oxo-3-furanyl 2-methyl-2-propenoate (PFHxS-Sulfonium, propenoate polymer)	911027-69-5

(10)The chemical analysis of substances is performed by means of currently available analytical techniques against substances laid down in Test Requested.

Persistent, Bioaccumulative, and Toxic (PBT) Chemicals under US EPA Toxic Substances Control Act (TSCA) Section 6(h)

Test Method: With reference to US EPA 3550C:2007, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A11
Decabromodiphenyl ether (DecaBDE) ^{Δ1}	1163-19-5	Prohibited	mg/kg	5	ND
Phenol, isopropylated phosphate (3:1) (PIP 3:1) ^{Δ2}	68937-41-7	Prohibited	mg/kg	5	ND
2,4,6-Tris(tert-butyl)phenol (2,4,6-TTBP) ^{Δ3}	732-26-3	3000	mg/kg	5	ND
Hexachlorobutadiene (HCBd)	87-68-3	Prohibited	mg/kg	5	ND
Pentachlorothiophenol (PCTP)	133-49-3	10000	mg/kg	5	ND
Conclusion					Pass

Notes:

- (1) The regulation is available at the following link.
<https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/persistent-bioaccumulative-and-toxic-pbt-chemicals-under>
- (2) ^{Δ1}: The submitted sample is exempted if it is plastic for recycling from products or articles containing Deca-BDE.
- (3) ^{Δ2}: The submitted sample is exempted from the regulated scope if it is anyone of the following:
 - Hydraulic fluids for aviation or military industry;
 - Lubricants and grease;
 - New and replacement parts for motor and aerospace vehicles;
 - Intermediate in a closed system to produce cyanoacrylate adhesive;
 - Specialized engine air filters for locomotive and marine applications;
 - Plastic for recycling from products or articles containing PIP (3:1);
 - Finished products or articles made of plastic recycled from products or articles containing PIP (3:1).
- (4) ^{Δ3}: The submitted sample is out of the regulated scope if it is not oil or lubricant.



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Phthalates

Test Method: With reference to EN 14372:2004, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A11
Dibutyl Phthalate(DBP)	84-74-2	%	0.003	ND
Benzyl Butyl Phthalate(BBP)	85-68-7	%	0.003	ND
Bis-(2-ethylhexyl) Phthalate(DEHP)	117-81-7	%	0.003	ND
Diisononyl Phthalate (DINP)	28553-12-0 /68515-48-0	%	0.010	ND
Di-n-Octyl Phthalate(DNOP)	117-84-0	%	0.003	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 /68515-49-1	%	0.010	ND
Dimethyl Phthalate(DMP)	131-11-3	%	0.003	ND
Diethyl Phthalate(DEP)	84-66-2	%	0.003	ND
Diisobutyl Phthalate(DIBP)	84-69-5	%	0.003	ND
Dipentyl Phthalate (DnPP)	131-18-0	%	0.003	ND
Dicyclohexyl Phthalate(DCHP)	84-61-7	%	0.003	ND
Bis(2-methoxyethyl)phthalate(DMEP)	117-82-8	%	0.003	ND
Diisopentyl Phthalate(DIPP)	605-50-5	%	0.003	ND
n-pentyl Isopentyl Phthalate(nPIPP)	776297-69-9	%	0.003	ND
1,2-Benzenedicarboxylic Acid,di-C6-8-branched alkyl esters,C7-rich(DIHP)	71888-89-6	%	0.010	ND
Di-n-Heptyl Phthalate(DnHpP)	3648-21-3	%	0.003	ND
1,2-Benzenedicarboxylic Acid,Di-C7-11-Branched and Linear Alkyl Esters(DHNUP)	68515-42-4	%	0.010	ND
1,2-Benzenedicarboxylic Acid,Dipentyl Ester,Branched and Linear	84777-06-0	%	0.010	ND
1,2-benzenedicarboxylic Acid,dihexyl ester branched and linear(DHxP)	68515-50-4	%	0.010	ND
Di-iso-hexylphthalate(DIHxP)	71850-09-4	%	0.010	ND
Di(2-propylheptyl)Phthalate(DPHpP)	53306-54-0	%	0.010	ND
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl Phthalate	68515-51-5 /68648-93-1	%	0.010	ND
Diisooctyl Phthalate(DIOP)	27554-26-3	%	0.010	ND
Dipropyl Phthalate(DPrP)	131-16-8	%	0.003	ND
Dinonyl Phthalate(DNP)	84-76-4	%	0.003	ND
Di-n-Hexyl Phthalate(DnHP)	84-75-3	%	0.003	ND

AfPS GS 2019:01 PAK-Polycyclic Aromatic Hydrocarbons (PAHs)

Test Method: With reference to AfPS GS 2019:01 PAK, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A11
Benzo(a)pyrene(BaP)	50-32-8	mg/kg	0.1	ND
Benzo(e)pyrene(BeP)	192-97-2	mg/kg	0.1	ND
Benzo(a)anthracene(BaA)	56-55-3	mg/kg	0.1	ND



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Test Item(s)	CAS No.	Unit(s)	MDL	A11
Benzo(b)Fluoranthene(BbF)	205-99-2	mg/kg	0.1	ND
Benzo(j)fluoranthene(BjF)	205-82-3	mg/kg	0.1	ND
Benzo(k)Fluoranthene(BkF)	207-08-9	mg/kg	0.1	ND
Chrysene(CHR)	218-01-9	mg/kg	0.1	ND
Dibenzo(a,h)Anthracene(DBA)	53-70-3	mg/kg	0.1	ND
Benzo(g,h,i)perylene(BPE)	191-24-2	mg/kg	0.1	ND
Indeno(1,2,3-c,d)pyrene(IPY)	193-39-5	mg/kg	0.1	ND
Phenanthrene(PHE)	85-01-8	mg/kg	0.1	ND
Pyrene(PYR)	129-00-0	mg/kg	0.1	ND
Anthracene(ANT)	120-12-7	mg/kg	0.1	ND
Fluoranthene(FLT)	206-44-0	mg/kg	0.1	ND
Sum of Phenanthrene(PHE), Pyrene(PYR), Anthracene(ANT), Fluoranthene(FLT)	-	mg/kg	-	ND
Naphthalene(NAP)	91-20-3	mg/kg	0.1	ND
Sum of 15 PAHs	-	mg/kg	-	ND
Material Category	-	-	-	-

Notes:

AfPS (German commission for Product Safety) : PAHs requirements

Parameter	Category 1	Category 2		Category 3	
	Materials intended to be placed in the mouth, or materials coming into long-term contact with skin (more than 30s) during the intended use -in toys according to Directive 2009/48/EC or -for the use by children ^{a,b} up to 3 years of age.	Materials not covered by category 1, coming into long-term contact (more than 30s) or short-term repetitive contact ^c with skin during the intended or foreseeable use ^d .		Materials covered neither by category 1 nor by category 2, coming into short-term contact (up to 30s) with skin during the intended or foreseeable use.	
		a. use by children	b. other consumer products	a. use by children	b. other consumer products
Benzo(a)pyrene (BaP) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo(e)pyrene (BeP) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo(a)anthracene (BaA) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo(b)fluoranthene (BbF) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1



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Benzo(j)fluoranthene (BjF) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo(k)fluoranthene (BkF)mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Chrysene (CHR) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Dibenzo(a,h)anthracene (DBA) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo(g,h,i)perylene (BPE) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Indeno(1,2,3-cd)pyrene (IPY) mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Phenanthrene (PHE), pyrene (PYR), anthracene (ANT), fluoranthene (FLT), mg/kg	< 1 Sum	< 5 Sum	< 10 Sum	< 20 Sum	< 50 Sum
Naphthalene (NAP) mg/kg	< 1	< 2		< 10	
Sum of 15 PAHs	<1	< 5	< 10	< 20	< 50

Notes:

- ^a A "Child" is legally defined as a person before reaching the age of 14 years.
- ^b Use by children includes both active and passive contact by children.
- ^c Definition "short-term repetitive contact" taken from REACH Annex XVII entry 50 amendment (Regulation (EC) No.1272/2013)
- ^d According to the definition of the German Product Safety Act (ProdSG) (chapter 1 Article 2 No. 28) "foreseeable use" shall mean the use of a product in a manner that the person placing it on the market, has not intended, but which could be reasonably foreseeable.

Remark:

The German committee on Product Safety (AfPS) published a new PAHs document (AfPS GS 2019:01 PAK) on April 10, 2020, which will be binding for the issue of GS mark certificate from July 1, 2020.

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019.



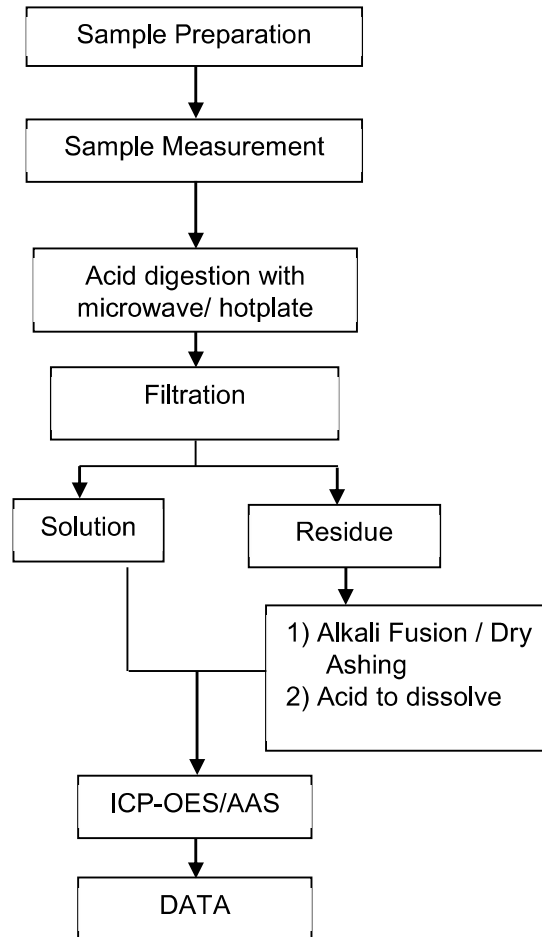
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Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.

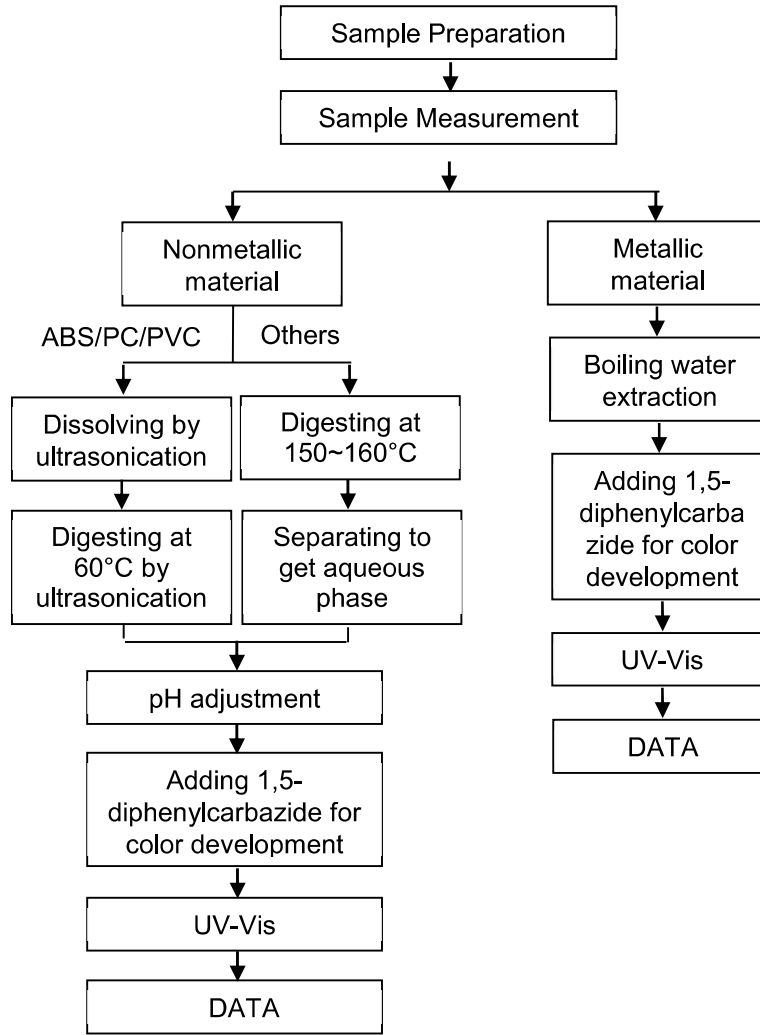


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Hexavalent Chromium (Cr(VI)) Testing Flow Chart

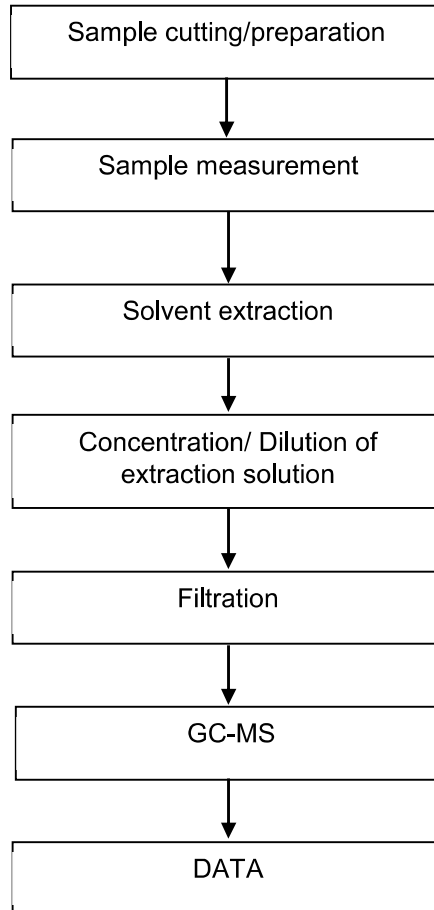


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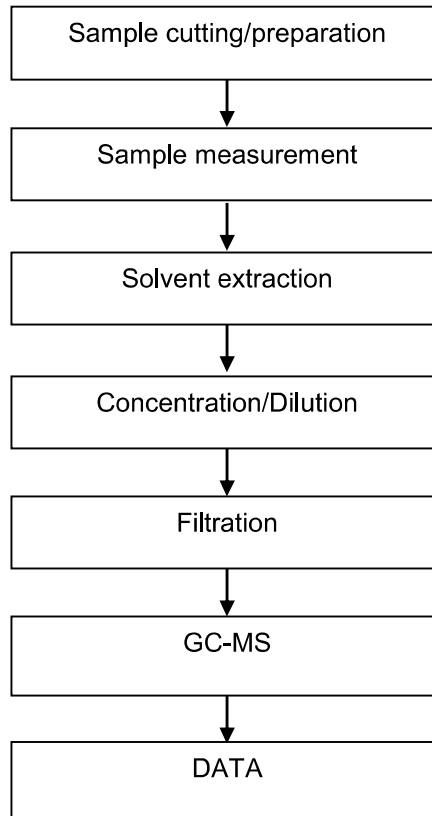
PBB/PBDE Testing Flow Chart



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Phthalates Testing Flow Chart

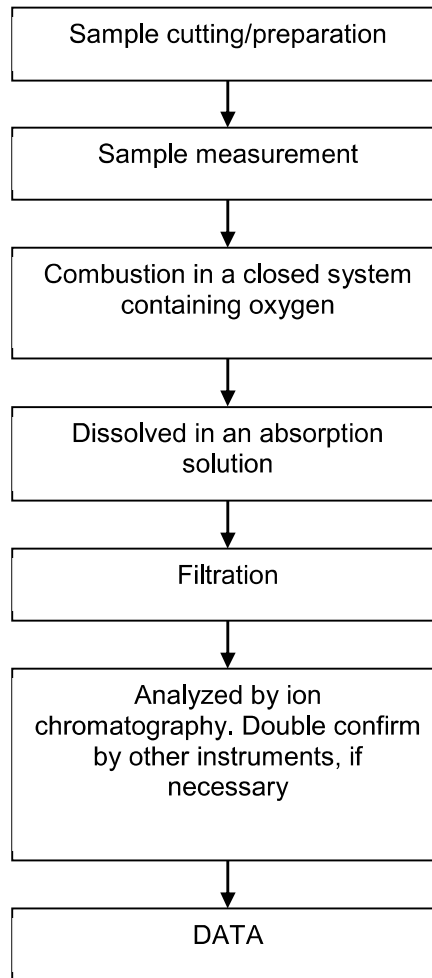


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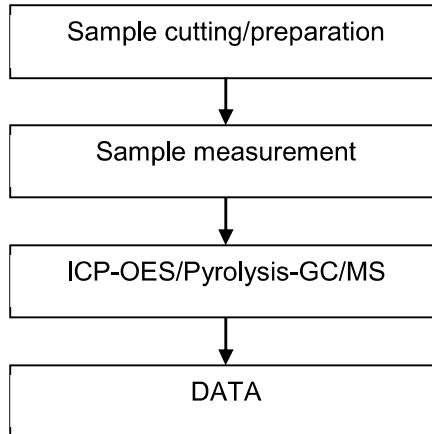
Halogen Testing Flow Chart



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Red Phosphorus Testing Flow Chart



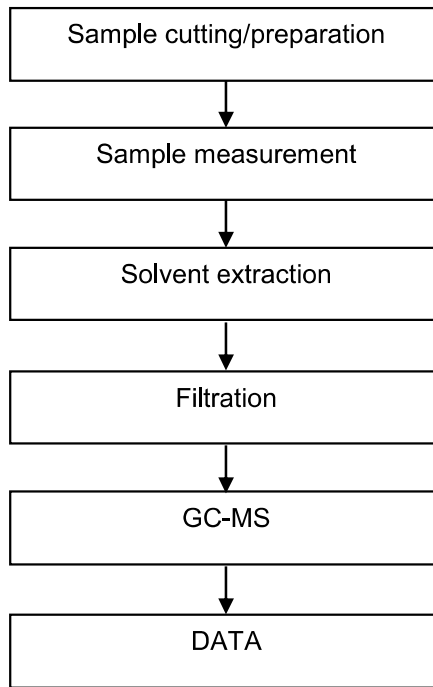
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Persistent, Bioaccumulative, and Toxic (PBT) Chemicals Testing Flow Chart

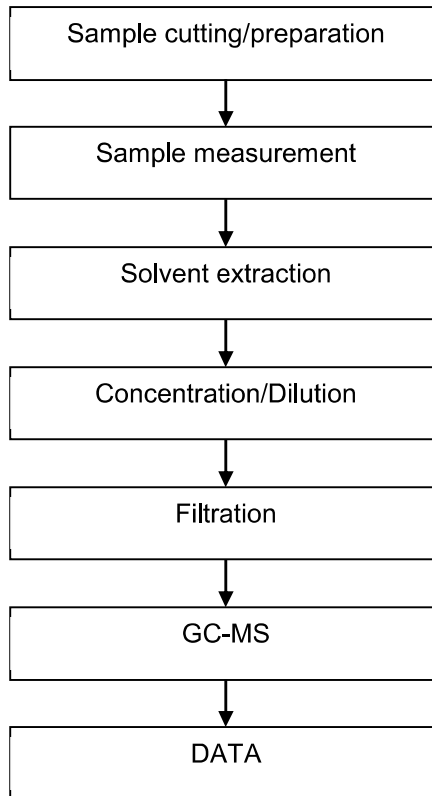


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PAHs Testing Flow Chart



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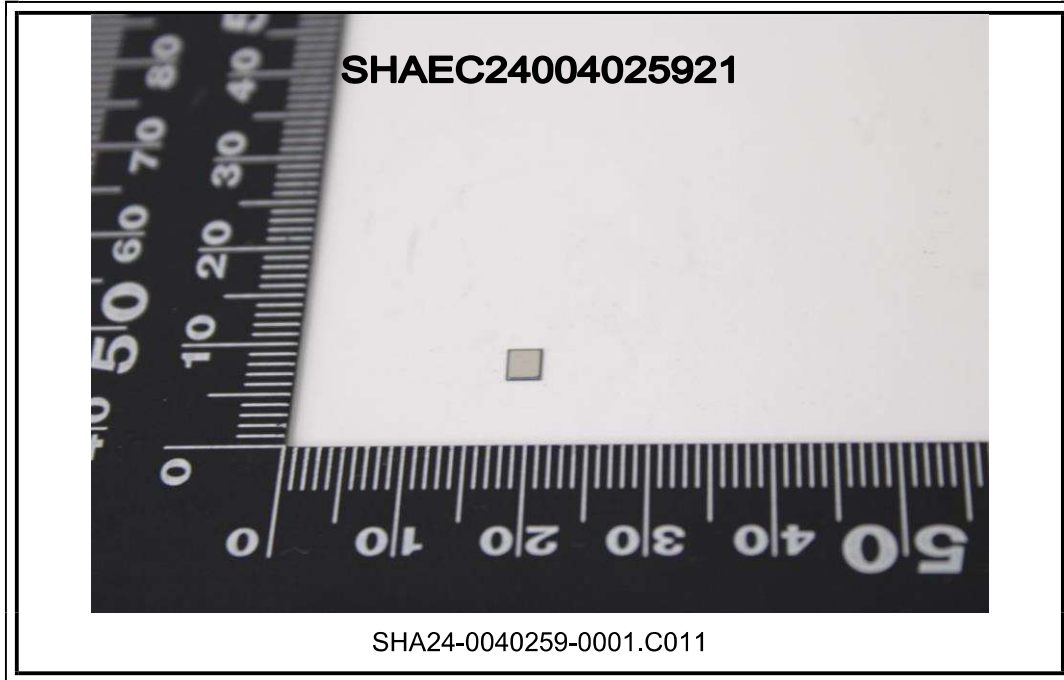
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